CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT

CD NO.

50X1-HUM

COUNTRY	Poland	DATE OF INFORMATION	1949
SUBJECT	Economic; Scientific - Chemical industry		
HOW PUBLISHED	Monthly periodicals	DATE DIST.	27 Jul 1950
WHERE PUBLISHED	Warsaw; Berlin	NO. OF PAGES	10
DATE PUBLISHED	Apr - Aug 1949		
LANGUAGE	Polish; German	SUPPLEMENT TO REPORT NO.	

THIS IS UNEVALUATED INFORMATION

SOURCE Periodicals as indicated.

THE SIX-YEAR PLAN FOR THE POLISH CHEMICAL INDUSTRY

PLANNED PRODUCTION INCREASES, EXPANSION OF INDUSTRY

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Apr 49
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In view of the favorable conditions for the development of the chemical industry provided by deposits of raw materials, one of the main tasks of the Six-Year Plan is to create a large modern chemical industry. The over-all increase for the industry should be 290-300 percent over 1949. By the end of the Six-Year Plan, imports of chemicals should be reduced, and exports should increase considerably.

The chemical industry should become second in importance to the coal industry. The Polish chemical industry's achievements and possibilities of development have not been publicized. They had been overshadowed by the great successes attained by the mining, metallurgical, and textile industries.

Polish technicians and economists have long been aware of the enormous opportunities for the chemical industry in Poland's black coal, brown coal, limestone, mineral salt, potassium salts, zinc, and anhydrite deposits.

Aside from a very small number of large modern plants like Moscice, built entirely or partially with government subsidies, the majority of the prewar chemical plants were small and diversified to resist cyclical swings. Consequently, the prewar Polish chemical industry had serious structural defects, with insufficient development of branches which could be completely supplied by Polish raw materials, especially the branch producing semifinished organic products. The branch of organic synthesis, dominant in the world today, was in its embryonic form in Poland before 1939.

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The situation deteriorated further as a result of war damage. The greatly damaged chemical factories of the Recovered Territories did not contribute essentially to the productive capacity or change the basic structure of the chemical industry.

In 1947, however, the prewar production level was reached. This level was considerably exceeded in the second year of the Three-Year Plan. Of all branches of production in Poland, the chemical industry, next to the metal-processing industry, has shown the greatest growth development dynamics, and the greatest increase over prewar production.

Like other nationalized industries, the chemical industry was reorganized during 1945 - 1948. The adoption of a unified system of administration, planning, financing, bookkeeping, pricing, standards, and wages, and the inclusion of all plants under one technological plan gradually transformed the loose conglomeration of plants controlled by the Central Administration of the Chemical Industry into one organic unit. However, the character of production did not change during this period since the main purpose of investments was the restoration of production apparatus wrecked by the war.

The fulfillment of the Economic Reconstruction Plan created the foundation for a long-range development plan for the chemical industry because a relatively high production level was attained, personnel requirements were filled, two thirds of the personnel being new, practical experience was obtained in the intensive investment program, construction was started on several new large-scale plants including a combine for organic synthesis and a large plant for intermediate organic products, and the technique of long-range planning was mastered.

Under the Three-Year Plan, another essential for the development of the chemical industry was met by the parallel development of large-scale power, electrotechnical, and engineering industries to serve the needs of the chemical industry.

Preparation for long-range expansion and transformation of the chemical industry was undertaken by the Central Administration of the Chemical Industry and its subsidiary associations by the end of 1947. Specialized problems were handled differently by individual associations, such as the Association of the Coal Derivatives Industry, which already had detailed long-range development plans. The Planning Department of the Ministry of Industry and Trade made a great contribution to the Six-Year Plan for chemistry.

Preparation of the plan requires protracted preliminary work. It is necessary to make a detailed analysis of the structure and production capacity of the chemical industry during the period preceding the plan. The direction of development must be decided upon, with respect to increase in production, modernization of installations, new branches of production, and exploitation of domestic raw materials.

Planned production figures must be consistent with the supply possibilities of raw materials and power, and with the demand for chemical products. Deliveries of necessary investment goods must be assured. Possibilities of securing and training new cadres must be examined thoroughly.

The plan for the chemical industry forms an integral part of the over-all Six-Year Plan. Vigorous economic and technological development is inconceivable without a well-developed chemical industry. Seventy percent of the products of this industry are semifinished products used by other industries. It supplies dyes for the textile industry, tannin for the leather industry, soda for the glass industry, explosives for the coal industry, bleaches for the paper industry, paints, electrodes, oxygen and acetylene for the metal and smelting

industries, and tires and fuel for the automotive industry. At present, the chemical industry cannot meet the rapidly growing industrial demand for many chemical products with the result that certain types of industrial development are limited. Since the chemical plants have reached the ceiling of their present potential, further growth in chemical production depends on the completion of important investment projects.

The chemical industry will create a permanent foundation for further development through the expansion of key branches of the inorganic chemical industry (sulfuric acid and soda), through great expansion of the foundation for more advanced processing of coal derivatives by doubling the production of crude tar and crude benzol, and through the creation of a great production branch for intermediate organic products, both coal derivatives and synthetics.

Intensified agricultural production, as envisioned by the Six-Year Plan, will have its counterpart in a 350-percent increase in the production of artificial fertilizers, and in a manifold increase in the chemical production of plant insecticides.

Modernization of the chemical industry will consist of activating certain production branches which do not now exist in Poland, but are assuming an increasingly dominant part in world chemical production. These include organic synthesis and synthetic products derived therefrom, and the production of antibiotics. Modernization of production methods will be achieved by the construction of adequately large plants, large-scale mechanization, and by introducing assembly-line processes, within technological limits. The fulfillment of these aims, supplemented by the unification and coordination of small plants, will bring about important changes in the structure of the chemical industry.

The production of pharmaceuticals will increase sixfold, bringing Poland closer to self-sufficiency. Production of such articles as rubber footwear and rubberized textiles, soaps, cosmetics, etc., will be increased many times, and proper attention will be given to the quality of these articles.

The selection of sites for 25 new chemical plants, to be created during the Six-Year Plan, is intended to equalize the degree of industrialization in various parts of the country.

Production branches which use very large quantities of cheap raw materials, like the coal derivatives and soda industries, must consider transportation costs of raw materials. For the remaining branches of the chemical industry, the unit value of the finished product is generally so high that even relatively long distances from supply sources of raw materials do not affect profitability. Such manufactures include pharmaceuticals, dyes, paints and varnishes, industrial gases, and rubber goods.

At present, nearly 30 percent of all plants under the Central Administration of the Chemical Industry are in Slask-Dabrowa Wojewodztwo. In the future, there will be a gradual shift to the central and eastern wojewodztwos. This shift is justified not only by social motives, but also by the necessity of exploiting such chemical raw materials available in those areas as sodium chloride, potassium chloride, anhydrite, gypsum, limestone, brown coal, and peat. In the central wojewodztwos, including eastern Poznan Wojewodztwo, 14 new chemical plants will be built during the years 1950 - 1955, including two plants in Warsaw. Four new plants will be activated in the eastern wojewodztwos, and three in the coastal area (Wybrzeze).

Only two plants employing a relatively small number of workers will be built in the overpopulated area of the coal basin of Upper Silesia. These two important new chemical centers will use buildings of former factories and will border on the coal valley on the west and on the southeast.

A large new center of the chemical industry is to be built in Poznan Wojewodztwo. The center of the soda industry in Pomorzo Wojewodztwo is to be expanded. New centers of chemical industry will be built in Kielce and Rzeszow wojewodztwos.

Further expansion of the chemical industry in parts of the country which are not industrialized will depend on expansion of the power network. The chemical industry, next to the coal industry, is the largest consumer of electric power.

Presented below are the most important production aims of various branches of the chemical industry during the 6-year period 1950 - 1955. For comparison, planned production for 1955 is expressed in relation to 1949 planned production.

In the inorganic industry there will be a great increase in the entire list of products, especially sulfuric acid and soda. Before the development of organic synthesis on a large scale, production of these two key products, because of their universal application, was considered an index of development not only for the inorganic branch, but for the entire chemical industry.

Sulfuric acid is being processed in Poland in plants of the chemical industry from imported pyrites. It is also produced in nonferrous metallurgical plants as a by-product from zinc blende, a domestic raw material.

In total national production of sulfuric acid, the proportion of sulfuric acid produced from pyrites was increased gradually in prewar years from under 10 percent in 1925 to approximately 40 percent in 1938, because of the dwindling deposits of blende. By the end of 1948, the proportion reached nearly 50 percent. Although the prewar production level was exceeded, there was a shortage of sulfuric acid in Poland during 1947 and 1948.

The Six-Year Plan should bring about a radical change not only in the quantity of sulfuric acid produced, but also in the method of its production. Production of this commodity in the plants of the Central Administration of the Chemical Industry is to be increased by 130 percent, exceeding production of acid from zinc blende by nearly 70 percent. Over half of the production increase is to be accomplished by a new plant which will produce sulfuric acid from abundant Polish deposits of anhydrite and gypsum. The USSR will supply all the installations for this plant, which will be the first in Poland, and the fifth in the world, to produce sulfuric acid by this method.

Conditions for development of the soda industry are very favorable in Poland, since all the necessary raw materials are available in abundance. Moreover, the demand for soda in Poland, as well as abroad, continues to increase. The total production of raw soda should increase by 140 percent. Among the different categories of soda, the highest increase -- 210 percent -- is expected for caustic soda, because of the expected demand from the rayon industry. Increased production will be based on the planned expansion of existing plants and on the building of new plants, for which the USSR will supply complete installations.

Among other important commodities of the inorganic chemical industry, considerable increases should be attained in the production of hydrochloric acid (190 percent), Glauber's salt (230 percent), bichromates (130 percent), and calcium carbide (90 percent). The increase in carbide production will be used almost exclusively for the production of acetylene for organic synthesis and welding.

The production of fertilizers will be greatly expanded. The total production of nitrogen compounds should increase by 230 percent, and phosphorus salts, 245 percent. Furthermore, it will be necessary to start production of potassium fertilizers from deposits discovered near Klodawa. Substantial quantities of mixed fertilizers will be produced in the form of nitrogen phosphates.

In the line of nitrogenous fertilizers, the construction of two large new plants is foreseen, one in Slask-Dabrowa Wojewodztwo and another in Poznan Wojewodztwo. Installations for the first plant have already been ordered in the USSR. In view of the onerous and health-wrecking working conditions in the manufacture of calcium cyanamide and because calcium cyanamide is relatively inert, no production increase of this fertilizer is planned. Efforts will be made, rather, to increase the production of saltpeters, in greater demand for agriculture. Production of the mixture of ammonium nitrate and calcium carbonate will rise by 220 percent, while the production of calcium nitrate will be increased nearly ten times. In addition, coke plants of the chemical, coal, and metallurgical industries will produce ammonium sulfate for agriculture in quantities twice as high as 1949.

As for phosphorus fertilizers, the overwhelming proportion of superphosphates is to be maintained, although the production increase in this category is to be less conspicuous (63 percent). There will be a manifold increase in the production of super Thomas meal, an alkaline phosphorus fertilizer, based largely on domestic soda. Production of super Thomas meal is to be increased 14 times from 1949 to 1955. A precipitate of dicalcium phosphate will be a new type of phosphorus fertilizer produced in one of the nitrogen plants together with calcium nitrate through the use of nitric acid for breaking down phosphorus compounds.

A greatly increased production of industrial gases is expected, with eight new plants, especially in oxygen and acetylene, built in connection with the expansion of engineering, metallurgical, and construction industries. Production of oxygen and acetylene is to increase by 170 percent. Oxygen and acetylene cylinders represent the most important investment item. Until now, a shortage of cylinders has created a bottleneck in production and distribution. Because of the cost of transporting cylinders, production of industrial gases has been decentralized by the construction of relatively small local plants serving customers in a given area within profitable radius limits of cylinder transportation. Under the Six-Year Plan the production and distribution of oxygen will be modernized in line with experience abroad. Several oxygen plants will be built, producing oxygen in liquid form to be transported by tanks to filling plants. This will bring about a radical reduction in transportation costs.

The production increase for carbonic acid will be high (230 percent). Besides sales to consumers, this commodity will be used industrially for the production of artificial ice.

Plants producing industrial gases will start production of inert gases, never before produced in Poland, but indispensable for the manufacture of neon bulbs and argon, neon, krypton, and xenon lamps.

Among by-products of industrial gas plants are welding and fitter's equipment -- burners, generators, valves, reductors. Products will be modernized and the volume of production increased many times.

The organic chemical industry will be greatly expanded, especially synthetics. The total value of organic chemical products is expected to increase sixfold by 1955, and to represent nearly 45 percent of total Polish chemical production.

The coal derivatives industry, after expansion of its own coke ovens and those of the coal and metallurgical industries, will double the amount of processed crude tar and crude benzol, increasing the production of a wider range of more highly refined products, including the hydrogenization of naphthalene and phenol into tetralin and cyclohexanol.

The coal derivatives industry will apply the method of continuous distillation of benzol and tar on a large scale. Production of carbon electrodes, much in demand for export, is to be increased threefold. The amount of gas piped through pipe lines by the Association of Coal-Oven Gas will be doubled during the period of the plan.

Plants for dry distillation of wood will not be expanded under the Six-Year Plan. There is a shortage of timber in Poland, and the primary products of dry wood distillation -- acetic acid and methanol -- will be obtained in larger quantities and more cheaply by organic synthesis.

The range of products obtained by organic synthesis is unusually diversified and extensive, including synthetic gasoline, rubber, plastics, synthetic resins, dyes, pharmaceuticals, solvents, etc. For this industry, a corresponding development of the manufacture of intermediate products of the dry distillation of coal and of synthesis is necessary. The latter has been nonexistent up to now in Poland. Under the Six-Year Plan, two big centers of organic chemical synthesis in many stages of production will be set up. These centers will produce basic semifinished products, and, to some extent, finished products. Construction of these plants was begun a few years ago, and is to be completed in the final years of the Six-Year Plan.

The first of these centers, located on the southeastern edge of the coal basin, will be a combine of 11 to 19 plants. Power will come from one of the largest electric power plants in Poland, built on the spot to exploit inferior grades of coal not suitable for export. The raw materials will be coal, including semicoke, and natural gas, limestone, and salt. The combine will include plants for synthetic gasoline, two for methanol and higher alcohols, a plant for calcium carbide, acetic acid, acetone, phenol, several plants for plastics, mostly based on vinyl compounds, and a plant for synthetic rubber (mersols).

A second center of large-scale organic chemical synthesis will be in Dolny Slask. The manufacturing process will apply both so-called wet synthesis and gas-contact synthesis, using products of the dry distillation of coal. It includes tannin, phenol, acetic salts of cellulose, caproic lactane, nitrogen and chlorine derivatives, phthalic acid anhydride, acetic acid, anhydride, and anthraquinone. These plants will be primarily a huge source of semifinished organic chemicals for the manufacture of dyes, pharmaceuticals, and plastics and for other industries such as leather, rayon, paper, and petroleum products.

The creation of a strong source of supply of semifinished products offers new opportunities for the manufacture of dyes. The production of dyes will be more than doubled during the Six-Year Plan. The highest grade dyes, never before produced in Poland, will be manufactured, including neolans, basic dyes, vat dyes, and dyes color-fast to light. The production of high-quality dyes requiring complicated technical processes is to be concentrated in one of the existing plants, while production of simpler dyes, mostly sulfur, is to be activated in a new dyestuff-manufacturing center in Rzeszow Wojewodztwo.

The pharmaceutical industry will also be the object of intensive expansion. This industry has not had a strong base in Poland in the line of semifinished products, and has not met more than 30 percent of the nation's requirements. A much greater demand for pharmaceuticals is expected from the rising standard of living and the extension of public health services, particularly in rural areas. Consequently, a sixfold increase is planned in the production of pharmaceuticals. Most of the intermediate products will be supplied by the organic chemical industry. Those semifinished products and raw materials which are produced in small quantities will be manufactured by pharmaceutical plants. The pharmaceutical industry will develop new manufactures, including synthetic hormones and vitamins, and antibiotics (penicillin and streptomycin).

There has been vigorous expansion in the paint and varnish industry, whose products are important for residential construction and for protection against corrosion. Production of varnishes will be increased more than fourfold using synthetic resins on a large scale. The production of zinc white, an important export commodity, will increase 2½ times and the production of ultramarine more than twice. Four large new varnish plants will be activated, one of which is intended to serve shipyards.

To tie in with the planned expansion of the automotive industry, the production of the rubber industry will increase. Besides the expansion of the Stomil factory, construction of two large tire and inner tube factories is planned, one in Rzeszow Wojewodztwo and the other in Warsaw Wojewodztwo. A plant for reclaiming rubber will be activated in Poznan Wojewodztwo, and a factory for the manufacture of industrial rubber goods will be built in Warsaw Wojewodztwo. The total production of tires and inner tubes is to be increased 4½ times. Production of rubber footwear will amount to 10 million pairs yearly.

In 1955 the aggregate value of chemical production will increase threefold, employment twofold, and production output by nearly 60 percent.

The plan of development for Polish industry as a whole during 1950 - 1955 around the chemical and power industries.

Progress in the chemical industry is not measured in quantitative terms alone. The reorganization and modernization of the industry and more intensive exploitation of Polish natural resources will have an important economic effect.

In preparing the chemical plan, careful consideration has been given to the market demand for each item in the light of competitive development of the industry abroad. Production figures are fixed according to a realistic estimate of domestic demand. This limit is exceeded only in those categories for which there is a strong and steady demand in foreign markets, and which are based on domestic raw materials: soda products, carbon electrodes, zinc white, lithopone, and certain dyes.

The feasibility of the chemical development program must be examined from the standpoint of financial resources, material resources, and manpower.

The financial problem in a planned economy is fundamentally the problem of using state investment appropriations in a proper and economical way. Under the Six-Year Plan, the average yearly investment appropriations will be four times higher than similar appropriations during the Economic Reconstruction Plan. Understandably, not all the investment items can be calculated accurately at present, but it is assumed that they will be covered by the total amount of appropriations, nearly 160 million zlotys. In fact, considerable savings are expected as a result of the rationalization and coordination of labor in building, installation, and engineering enterprises.

One of the main bottlenecks hampering the development of Poland's chemical industry was the lack of a sufficiently well organized chemical equipment industry. In the early stage of economic reconstruction, there were also many difficulties in placing orders abroad. Foreign factories could not handle the temporary postwar rush for equipment and often delayed deliveries several years.

The situation is expected to change radically in the near future. The domestic chemical equipment industry will be developed both within the chemical industry and within the engineering industry. The production capacity of this branch of industry will increase nearly ninefold. This industry will be in a position to fill various types of orders, especially for less complicated equipment.

Orders to be placed abroad can be prepared well in advance for deliveries distributed over the entire 6-year period. Orders for a number of investment installations for the Six-Year Plan were already placed abroad in 1948, when the plan was under preparation. The greatest contribution to the chemical industry will be the delivery of complete installations for six large plants from the USSR and the assurance that the USSR will help assemble and activate the plants.

In regard to manpower, the chemical industry will require approximately 60,000 new workers from 1950 to 1955. Of this number, about 48,000 are to be employed by the existing plants and about 22,000 by new factories. Recruiting of unskilled workers should not present difficulties. Vocational training, intensively developed by the Central Administration of the Chemical Industry from 1946 to 1949, will provide workers of average qualifications. These schools were attended by 5,690 students in 1948 - 1949. The number will gradually increase in the coming years to 13,000 students in 1954 - 1955.

The greatest difficulty is to find the necessary number of engineers. The serious shortage of engineers has been felt keenly throughout the preceding period. The plan will require an influx of at least 200 new engineers annually. In view of the fact that there are now six polytechnicums instead of two, and that the average number of new engineers each year will exceed 5,000 during 1950 - 1955, it may be assumed that the chemical industry will obtain at least the indispensable minimum of technical personnel. The relatively smallest shortage will be among chemical engineers. There will be some difficulties in finding an adequate number of mechanical and electrical engineers because of the increasing demand for engineers in the engineering, power, and electrical industries. The shortage of engineering personnel can be relieved partially through the training of capable workers and foremen, especially in those plants which have a stable production cycle. It can be done by shifting a certain number of engineers from these plants to new production branches, where the handling of new production methods requires extensive theoretical preparation.

The chemical program under the Six-Year Plan is thoroughly realistic, even though its fulfillment will require an unusually great effort and the mobilization of considerable material resources.

Expansion of the chemical industry under the Six-Year Plan represents only the first stage in the modernization of this branch of production.

DEVELOPMENT OF BRANCHES OF THE CHEMICAL INDUSTRY

Chemische Technik
No 2, Aug 49

The basis for the development of the Polish chemical industry is the possession of natural resources, which have not yet been fully utilized. The development of the chemical industry is necessary, because of the increased demand for chemical products by other branches of industry.

Taking the 1949 level of production as 100, production during the last year of the Six-Year Plan will be 249. The greatest increase will be in the fields of the chemical industry for which there is a natural base in the country, i.e., the fields which use coal, rock salt, gypsum, zinc, and lead as raw materials.

One of these fields is the production of artificial fertilizers, especially nitrogen fertilizers. The consumption of nitrogen fertilizer in Poland was 1.6 kilograms per hectare in 1937 - 1938; in 1948 - 1949 it had increased to 4.3 kilograms, while the Six-Year Plan calls for a consumption of 12 kilograms of nitrogen fertilizer and 15 kilograms of phosphate fertilizer per hectare during the last year of the plan.

The soda industry is to be expanded considerably. It has already doubled the 1937 level and is to be quadrupled by the end of the Six-Year Plan.

Coke production is already double that of 1937. By 1955, it is to be four times as high as prewar production. The production of by-products, such as tar and benzene is to be increased simultaneously.

The production of the pharmaceutical industry is to increase to five times the present production, and will completely cover all domestic requirements of most drugs, including penicillin.

This increase in production will also mean an increase in the number of persons employed by the chemical industry. Seven thousand chemists will be trained yearly by professional and secondary schools, while the workers already employed by the industry will be given courses to fill the gaps in their training.

PROSPECTS FOR DEVELOPING THE FERTILIZER INDUSTRY

Chemische Technik
No 1, Jul 49

The Polish fertilizer industry is confronted by great problems, in conjunction with the social and economic changes in Polish agriculture. According to prewar data, average consumption of artificial fertilizer in Poland per hectare of cultivated area was 1.66 kilograms N, 3.09 kilograms P_2O_5, and 2.30 kilograms K_2O in 1937 - 1938. A number of fertilizer plants were either badly damaged or dismantled during the war, such as the synthetic fertilizer factory at Moscice. Investment credits, and the efforts of workers and technical personnel have made it possible to resume production in these plants and even to increase production in some instances. It was thus possible to increase the consumption of artificial fertilizer to 3.85 kilograms N, 2.68 kilograms P_2O_5, and 4.30 kilograms K_2O in 1947 - 1948.

This increase is not due to a temporary period of prosperity, but is part of the economic plan and conditions favor a further improvement of the situation.

Nitrogen Fertilizer

At present, there are two plants in Poland. By eliminating bottlenecks, expanding and adding new facilities, production has been increased, but the increase is still not great enough to bring production to the required level. New plants will have to be built. After this has been done, 201,390 tons of nitrogen are to be produced by four plants.

To this must be added the nitrogen which becomes available from the coal, coke, and metallurgical industries, in the form of ammonium sulfate. According to the plan, and taking into account the fact that a small portion of this nitrogen will be used for other industrial purposes, the total production is to be 219,440 tons per year, or approximately 3.5 times the present production.

Phosphate Fertilizer

At present, the most important phosphate fertilizer in use is superphosphate, since bone meal and Thomas meal are available only in insignificant quantities. The production of super Thomas meal was started a few months ago. The Six-Year Plan calls not only for an increase in production, but also for an increase in the number of varieties of phosphate fertilizer produced. It is also planned to make a new type of mixed nitrogen and phosphate fertilizer, known as "Nitrophosphate." Its suitability is still to be tested. After this branch of the fertilizer industry has been fully developed, it will produce superphosphate, super Thomas meal, and nitrophosphate. In addition, a new metallurgical plant will supply P_2O_5 in the form of Thomas meal. The entire production of phosphate fertilizers (P_2O_5) is to be increased to five times its present level.

Potassium Fertilizer

This is the most difficult problem, since potassium fertilizer is available only from imports. To eliminate this bottleneck, test drillings are being carried out in a recently discovered potassium deposit. If these drillings should prove successful, three of four mines and four or five processing plants will be required to produce 100,000 tons of K_2O.

In summary, it can be stated that the increase in nitrogen fertilizer production, according to the long-range plan, will bring production up to about 3.5 times the present level, while phosphate fertilizer production will be increased five times. This will eliminate all necessity for importing these products. The amounts per hectare of cultivated area will be increased to approximately 13.3 kilograms N and 15.7 kilograms P_2O_5. Assuming the most favorable conditions, approximately 6 kilograms K_2O per hectare of cultivated area will be added to this. The latter quantity is not adequate, as compared with the two other kinds of fertilizer. The Polish fertilizer industry is thus still confronted with many problems. The planning of a number of new plants of different types, working out of new methods of production, both in the laboratory and in industry, and the construction and operation of new plants will be required. The cost of all these plans is estimated at 48,500,000,000 zlotys.

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